



**Barcelona
Supercomputing
Center**

Centro Nacional de Supercomputación



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EARTH SYSTEM SERVICES

Institut Català de Recerca de l'Aigua (ICRA)

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Services – Earth Science Department



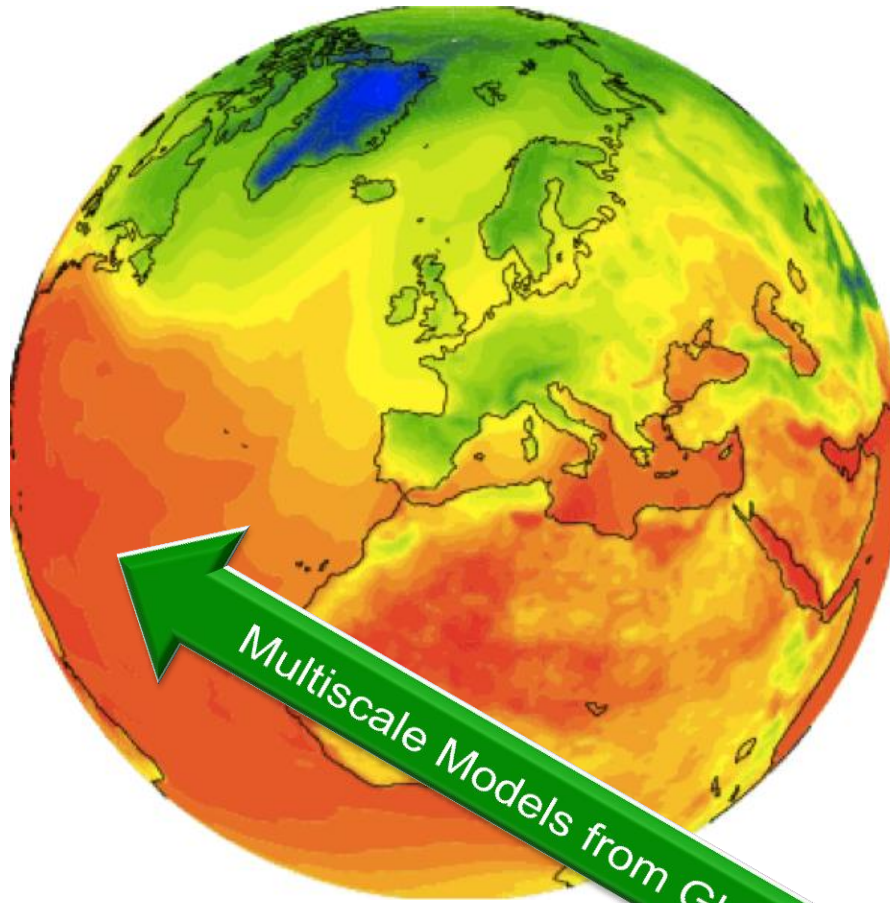
- Created in 2005; 450 employees
- Research, develop and manage information technology
- Facilitate scientific progress and its application in society

Earth Science Department

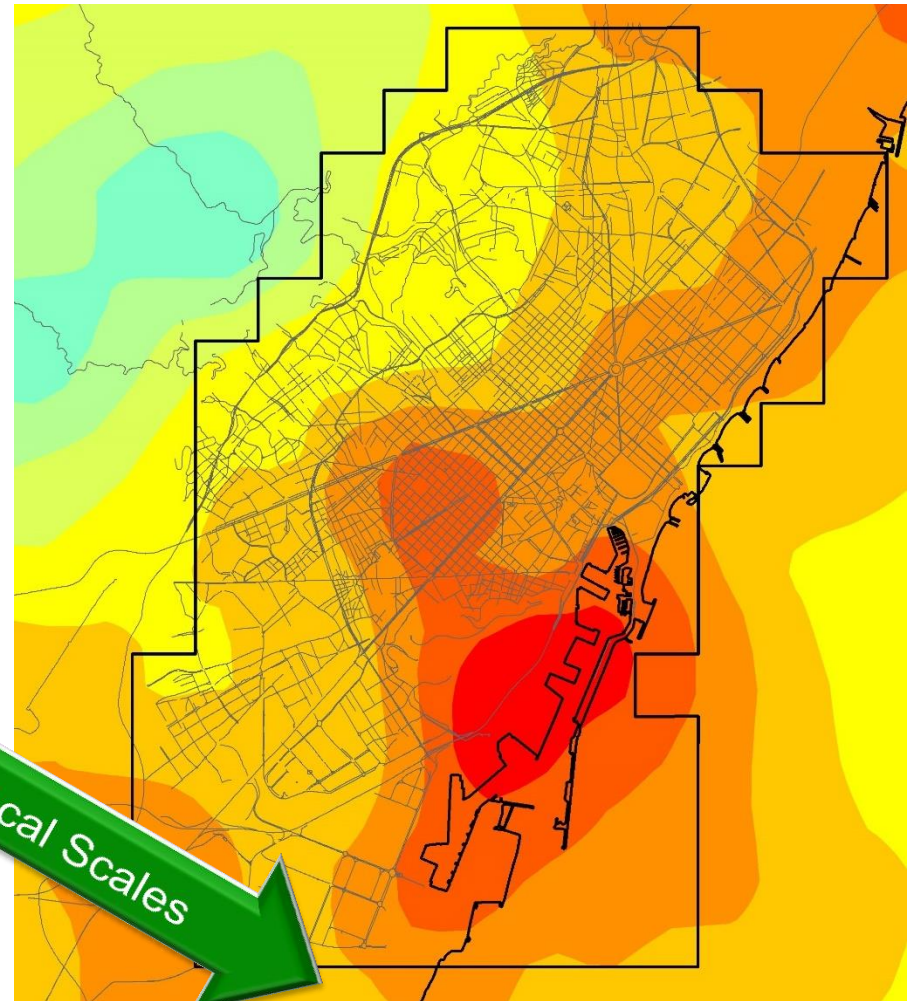
- **Atmospheric composition modelling**
- **Climate prediction modelling**
- **Computational Earth Sciences**
- **Earth Sciences Services**



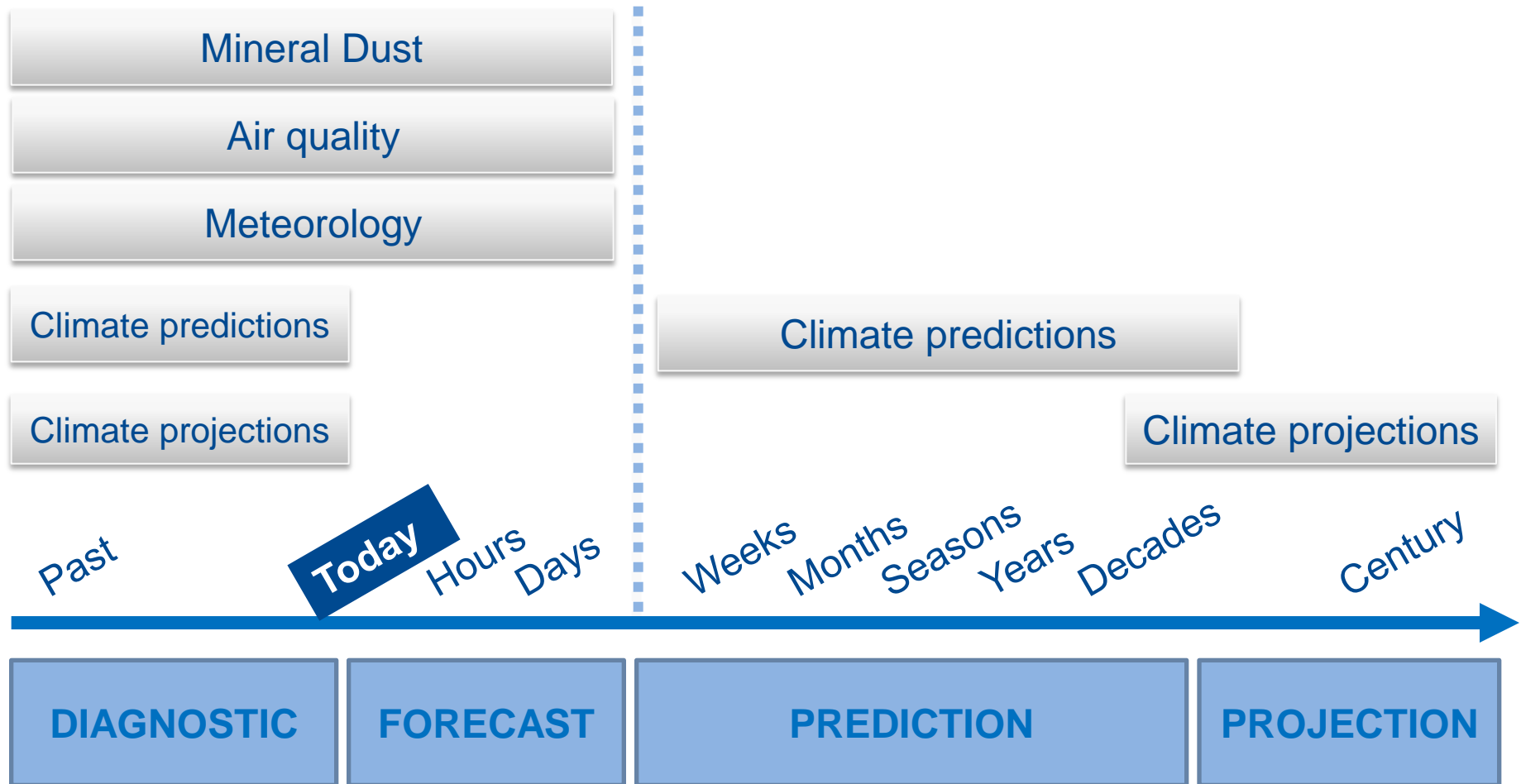
Multi-scale models from global to local scales



Multiscale Models from Global to Local Scales



Temporal scales

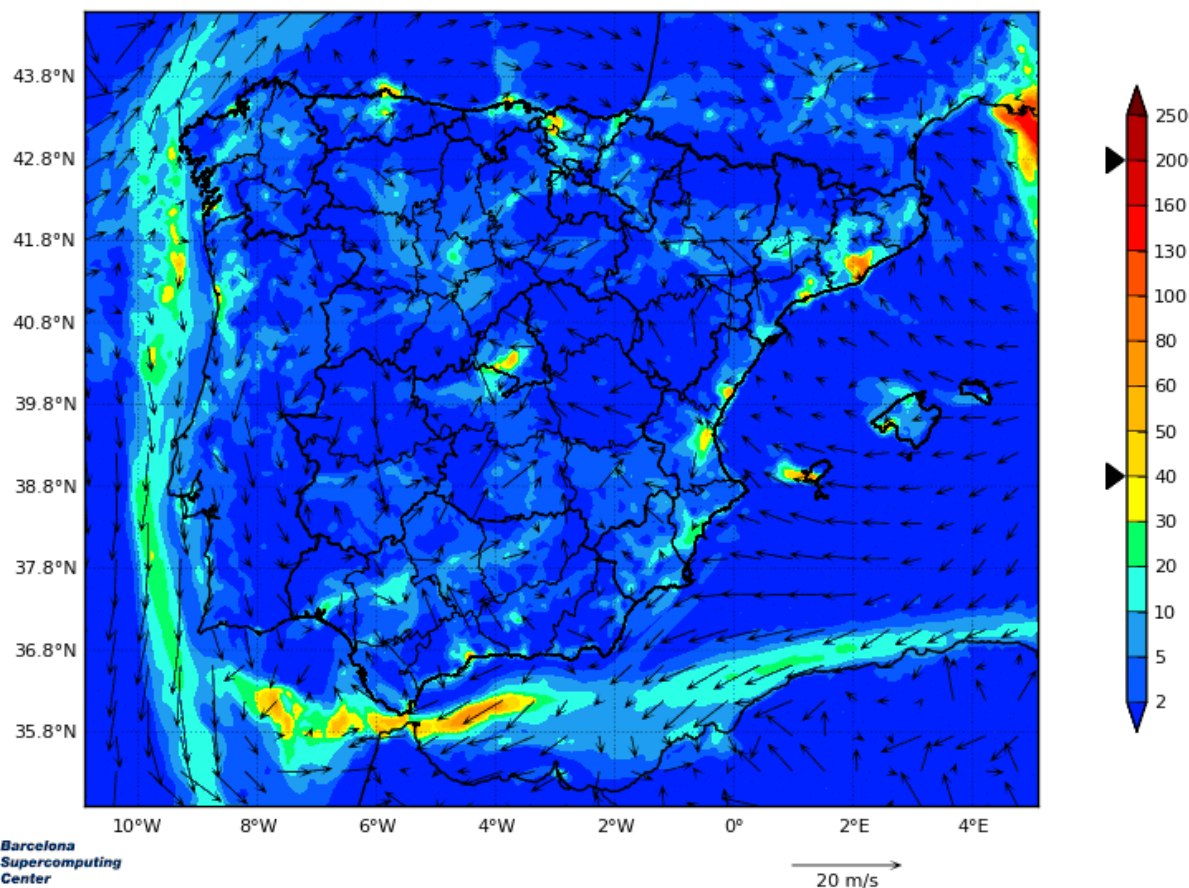




Research lines: Atmospheric composition

Provides air quality related information for the coming days and for the application of short term action plans for air quality managers.

BSC-ES/AQF WRFv3.5.1+CMAQv5.0.2+HERMESv2 Nitrogen Dioxide ($\mu\text{g}/\text{m}^3$)
00h forecast for 00UTC 17 Jul 2015 - Iberian Peninsula Res: 4x4km



Information is delivered using both online or custom applications:

www.bsc.es/caliope

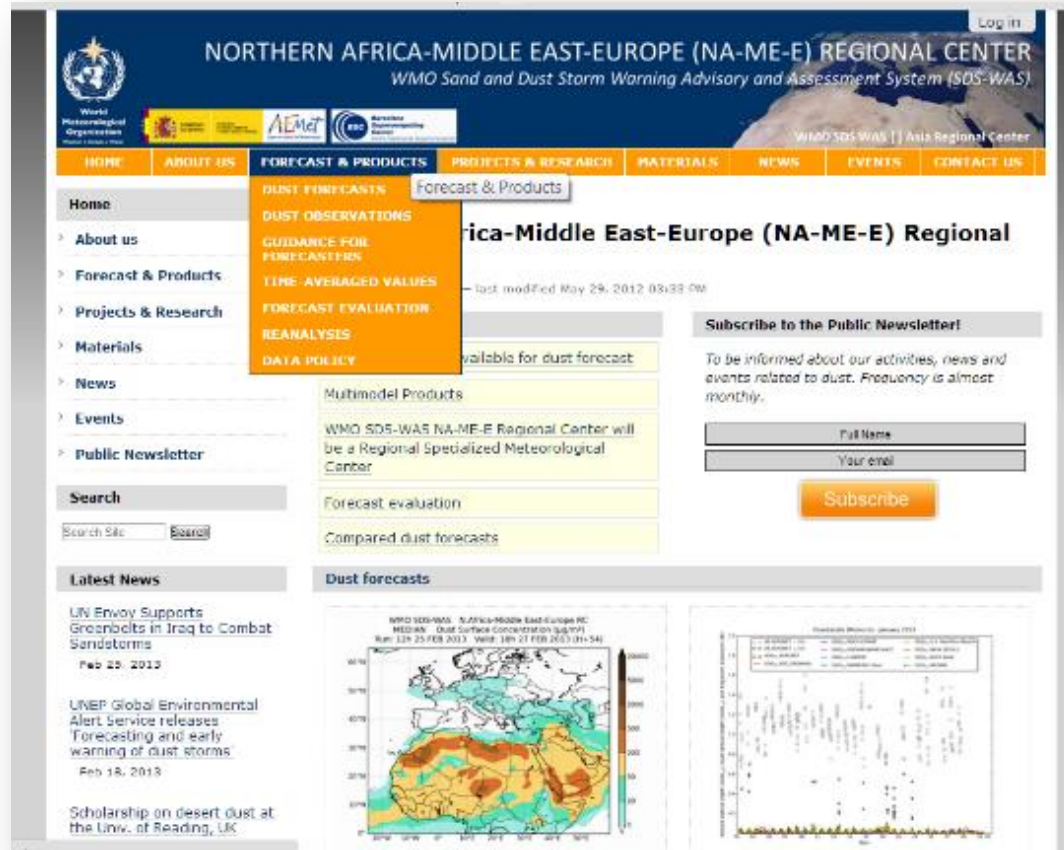


Mineral dust forecasts SDS-WAS

North Africa, Middle East and Europe Regional Center

Early warning system

<http://sds-was.aemet.es>



The screenshot shows the homepage of the Northern Africa-Middle East-Europe (NA-ME-E) Regional Center for the WMO Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS). The page features a navigation menu with links to Home, About us, Forecast & Products, Projects & Research, Materials, News, Events, and Contact Us. A sidebar on the left contains a search bar and a list of latest news items, including 'UN Envoy Supports Greenbelts in Iraq to Combat Sandstorms' and 'UNEP Global Environmental Alert Service releases Forecasting and early warning of dust storms'. The main content area displays a 'Forecast & Products' dropdown menu with options like 'DUST FORECASTS', 'DUST OBSERVATIONS', and 'GUIDANCE FOR FORECASTERS'. Below this, there is a section for 'Multimodel Products' and a 'Subscribe to the Public Newsletter' form. The bottom of the page shows a map of the region with dust concentration forecasts and a table of dust forecasts.



Research lines: Climate predictions

How can we predict climate for the coming season if we cannot predict the weather next week?

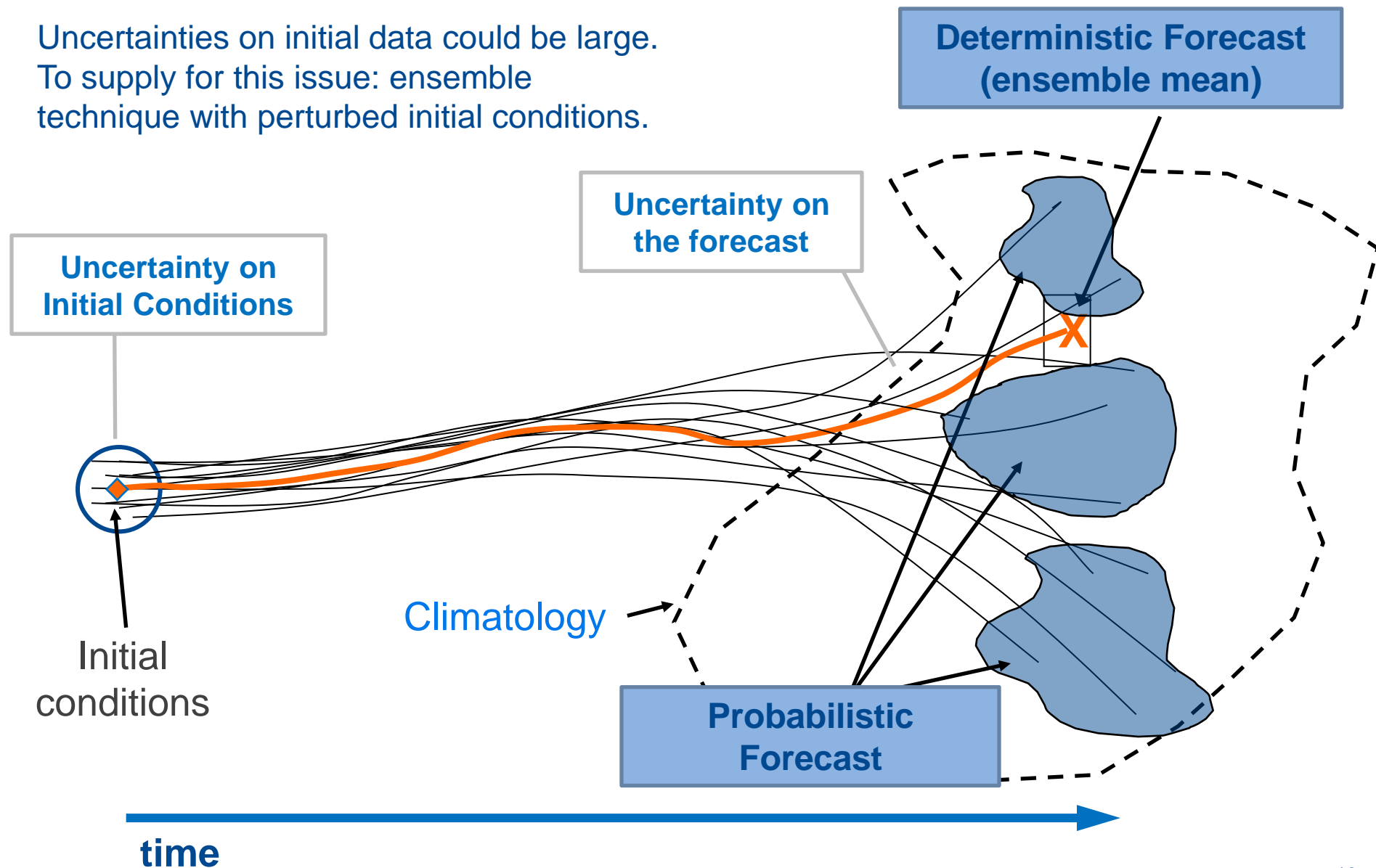
Weather forecasts

The forecasts are based in the initial conditions of the **atmosphere**, which is highly variable and develops a chaotic behaviour after a few days

Climate predictions

The predictions are based in the initial conditions of the **sea surface temperature, snow cover or sea ice**, which have a slow evolution that can range from few months to years.

Uncertainties on initial data could be large.
To supply for this issue: ensemble
technique with perturbed initial conditions.



**CLIMATE
PREDICTIONS**

PROJECTIONS

RE-ANALYSES

APPLIED RESEARCH

Validation

Post-processing

Calibration

Skill assessments

Computational skills

Climate drivers Data
management

CLIMATE SERVICES

User-defined requirements

User interface Platforms

Knowledge transfer

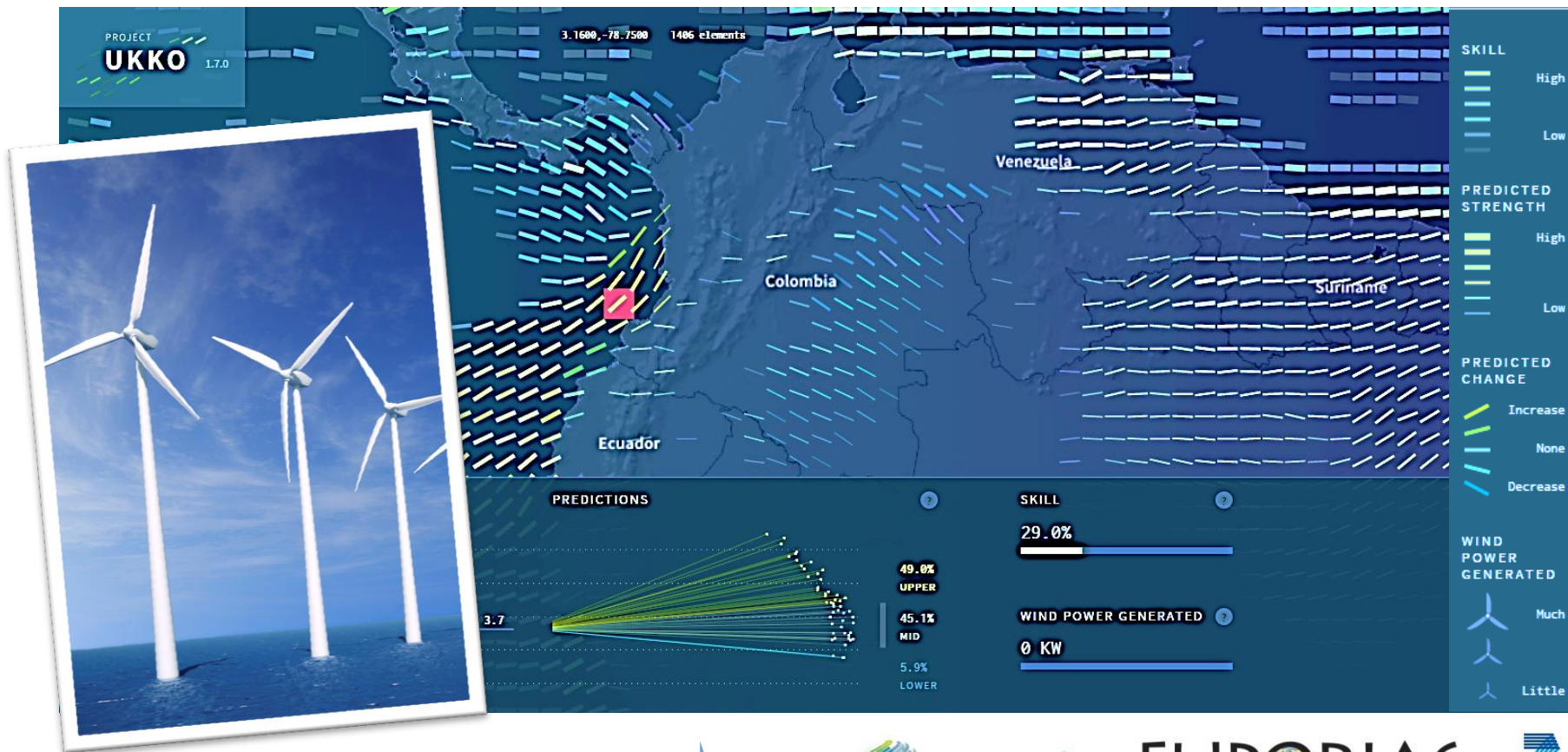
Informing Decision making

Seasonal wind power predictions



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RESILIENCE
PROTOTYPE



EUPORIAS

Clim4Energy



edf



renewables

ALSTOM



VORTEX



EnBW

Seasonal predictions of Hurricanes



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Seasonal predictions and projections for agriculture



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TORRES



SOGRAPE VINHOS



DESDE 1551

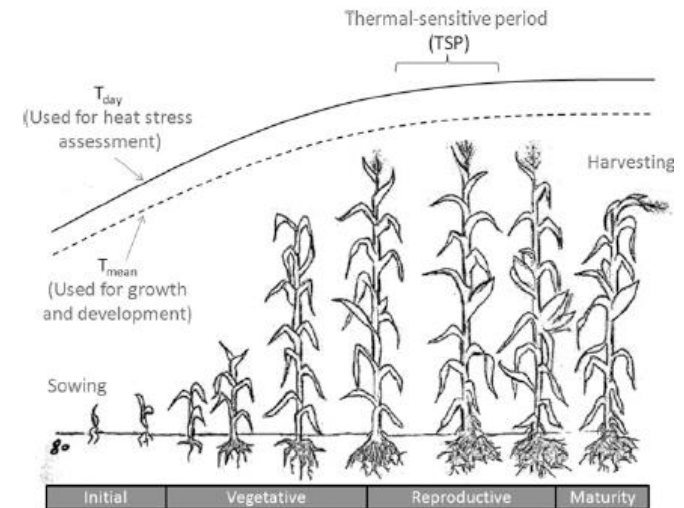
CODORNÍU



JRC

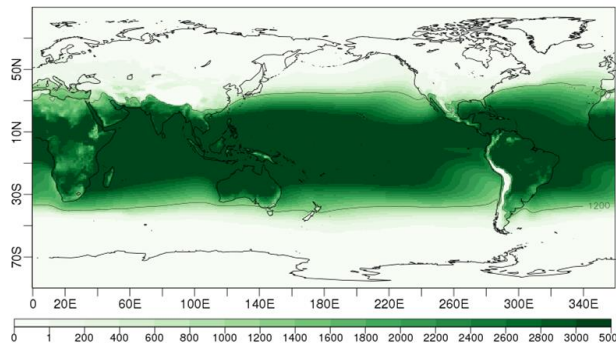
EUROPEAN COMMISSION

icta

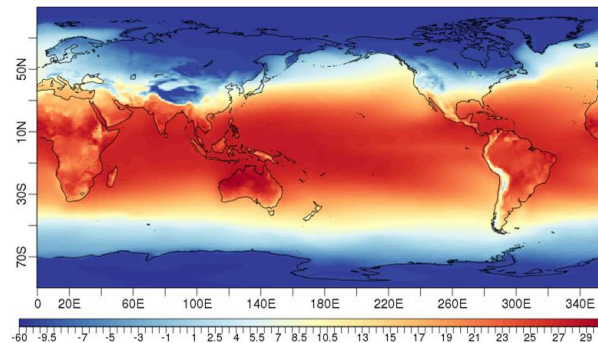


Source: Teixeira et al., 2013

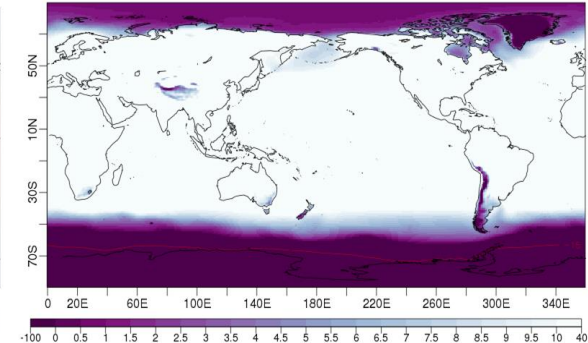
Winkler Index Oct-Abr



Mean Temperature Oct-Abr



Winter Severity Index





IMPRESX: Improving predictions and management of hydrological extremes

- Seasonal predictions
- Skill assessments
- User engagement in the project



EUPORIAS

Potential applications:

- Hydroelectric power management
- Early warning systems
- Flood and drought risk assessment
- Downscaling of climate variables.

Earth System Services partnership in EU Projects in climate services



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SPECS: Seasonal-to-decadal climate Prediction for the improvement of European Climate Services



EUPORIAS: EUropean Provision Of Regional Impact Assessment on a Seasonal-to-decadal timescale



NEWA: New European Wind Atlas



PRIMAVERA: Process-based climate simulation: advances in high-resolution modelling and European climate risk assessment



IMPRES: Improving predictions and management of hydrological Extremes



CLIM4ENERGY: Climate for Energy

National and International collaborations



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Research centers



Local administrations and international organizations



Meteorological offices



National and International collaborations



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Industrial partners. Air quality



Industrial partners. Energy



Industrial partners. Agriculture





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Thank you!

For further information please contact
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